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ABSTRACT

These proceedings contain a series of papers focusing on the fact that women in Scotland and England are significantly underrepresented in learning about and working with computers and suggesting ways of remedying the situation. The volume begins with an introduction by Elisabeth Gerver and a foreword by Margaret Boden. The following conference reports are included: "Where Are We Now," by Angela Bowey; "Survey of Computer-Related Courses in Scottish Central Institutions, Colleges, and Universities," by Kay Henning; "Women, Computers, and Adult Education," by Elisabeth Gerver; "Positive Action in England," by Wendy Miller; and "Positive Action in Scotland," by Gillian Skirrow. Also included are brief workshop reports on the following topics: work training, further education, higher education, community education, and broadcasting. An overview of the main issues raised by the conference participants is also included. Appendixes include a survey of gender composition in computer-related courses in Scottish colleges, universities, and central institutions; the seminar program; a list of participants; and a membership listing of the joint working group on women and computers. (MN)

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Scottish Institute of Adult and Continuing Education

Women and Computing in Scotland

A conference held on 14 June 1985 at the University of Strathclyde

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Edited by Chris Pilley

for

JOINT WORKING GROUP ON WOMEN AND COMPUTERS

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Women and Computing

in Scotland

A conference held on 14th June 1985

at the University of Strathclyde

Edited by Chris Pilley for

Joint Working Group on Women and Computers

Scottish Institute of
Adult and Continuing Education
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INTRODUCTION

"Women and Computing in Scotland," based on reports from the conference on "Women and Computing" draws attention to the fact that women are significantly under-represented in learning about, and working with, computers and suggests possible solutions to the problem.

The conference was the first public event mounted by the Joint Working Group on Women and Computers. The group was formed in 1984 by a number of institutions and individuals who are actively involved in computers and adult education. It aims to explore what action can be taken to redress the sexual imbalance in the use of computers. The group is now exploring other ways of promoting positive action on women and computers in Scotland, including the creation of a database of information about current developments in the field and discussion with school teachers and HM Inspectorate.

The report begins with a foreword by Professor Margaret Boden, whose illness unfortunately prevented her from addressing the conference in person. Professor Angela Bowey, who chaired the morning session, then draws attention to the urgency of the situation in which girls and women are turning away from computers.

The following paper, Kay Henning's "Survey of Computer-Related Courses in Scottish Central Institutions, Colleges and Universities" provided one of two main background papers for the conference. In it, and in the Appendix I, she provides dramatic evidence of the male bias of most courses in computing and computer-related subjects. She also reports illuminatingly on staff attitudes to the under-representation of women, with both encouraging and alarming comments from school teachers and lecturers.

My own paper, "Women, Computers and Adult Education," was based on the findings of the other main background paper, "Women, Computers and Adult Education: "Liberation or Oppression?", which appeared in the Scottish Journal of Adult Education, vol. 7, 1, Spring 1985. It argues that the under-representation of women in computing holds the seeds of a long-term threat and suggests possible ways of redressing the balance. Dr. Wendy Miller's "Positive Action in England" next describes the way in which the Women's Technology Training Workshop in Sheffield has opened up new opportunities especially for women who want to learn new skills and to get interesting jobs. In "Positive Action in Scotland," Gillian Skirrow then outlines strategies for encouraging more girls to study computer science, such as improving careers guidance, conducting outreach activities, and removing both hidden and overt sexist barriers.

The workshop reports which follow include only the highlights of the wide ranging and exciting discussions which took place during the afternoon. They are brimming over with analyses of the nature of the current interaction between women and computers and with imaginative, practical suggestions for how it can be improved. The last section,

"Perspectives", is a snapshot of some of the comments which participants made in the plenary sessions of the conference. Finally, the appendices provide detailed information to support Kay Henning's paper, the conference programme, a list of participants, and a note about the membership of the Joint Working Group on Women and Computers.

The conference and this report have been funded in part by the Equal Opportunities Commission and the Scottish Community Education Council. We are very grateful for their support. It has also been made possible by the dedication and sheer hard work of the members of the Joint Working Group on Women and Computers, especially by Lesley Hart who served as secretary to the Group, and Chris Pilley, who edited the report.

We hope that this report of our hopes and our concerns will remind those who were present of a stimulating and productive day and will persuade the wider community of educators to take more positive action in support of women in computing.

Elisabeth Gerver
Convener
Joint Working Group on Women and Computers

FOREWORD

Margaret Boden

This report highlights the many problems that still lie in the path of women - and, more especially, girls - who could benefit from learning to use and evaluate computers.

The fact that I could not write "women and girls who want to learn about computers" betrays the greatest problem of all: most people perceive computers as essentially male-oriented. It is a depressing fact, for instance, that the Government's well-intentioned policy of putting at least one micro-computer into every school has resulted in less than 20% of classroom "hands-on" time being taken up by girls.

Why is this? One paper in this volume suggests that the aggressive, "shoot-'em-down", attitude of the games typically found in public arcades and home-computer software lessens their attractiveness in the eyes of many girls. Moreover, computers are machines, which in general tend to be seen as a peculiarly masculine preserve. And they are machines of a particularly opaque sort, based on scientific principles which most women have not been educated to understand. Still worse, they are commonly seen as machines to be used by the scientist, by the mathematician - which is to say, by men.

"What's wrong with that?", someone might say. "They do sums, don't they? Like it or not (and the authors of this report do not like it), most sums, and most scientific problem-solving, are done by men".

This complacent remark would be unfair not only to women, but also to computing. Quite apart from the obvious response - no less important for its being obvious - that we must find ways of encouraging more girls to be scientists and mathematicians, computing is not "about sums", it is not an essentially numerical, or even algebraic, activity. Computers can be used for mathematical purposes, but they do not have to be. They can, in principle, manipulate verbal or pictorial symbols as well as numerical ones.

Consequently, from the fact that depressingly many girls are loath to identify themselves with mathematics, it does not follow that they must be equally ill-at-ease with computing. As some of these papers illustrate, computers can be used for language-based tasks as well. An example (too recent to have been mentioned in this book) is a computer program that can help chidren - boys too! - to develop their prose-writing skills: not just their vocabulary and grammar, but their reative story-planing (M. Sharples, Cognition, Computers, and Creative Writing). In our culture, most girls do not develop an insidious fear of words. Indeed, in their early years at school their verbal skills are significantly better than those of boys. Even granted that current social prejudices (which women share: that is the

pity of it) put a barrier between women and science, there is no principled reason why they should not take as readily to computing as their male peers do.
But our computers, and our schools too, do not exist in a vacuum. They are situated within our society, which as well as having particular expectations about gender-roles, has a particular set of social institutions - financial, commercial, political, whatever. So long as only a few businesses provide a creche, and only a few employers tolerate flexi-time, most women will be hard-pressed to find time for to become familiar with this new and challenging technology. Some papers address this issue, highlighting the reality of many married women's lives, and the special problems of providing training opportunities for them.

One answer that is sometimes suggested to the dilemma of the working mother (supposing there is work to be found) is home-work: no problems about baby-sitting there. This work-pattern is often recommended with specific reference to home computers. It is true that if a woman wishes to work at home, then micro-computers can make it possible for her to do so, and we should educate women to be able to do this if they choose.

There are dangers here, however. Experience in other fields suggests that the employment of non-unionised and socially separated women, especially women desperate to get paid work of any kind, leads to their exploitation. Admittedly, this applies more to women doing "piece-work" (whether sewing or secretarial) than to women who have a "real job" which they happen to perform at home. But they, too, will be socially isolated, away from the mainstream of office-life. The same applies, of course, to men who work hunched over their micros in their own living-rooms. Some writers of this report stress the importance of making computing convivial, of installing computers in community settings, and using them for community purposes. Adult education in particular, the special concern of the SIACE, could benefit from the imaginative and socially-sensitive use of computers.

Computers have the potential of aiding us in many ways, men and women alike. Our first priority must be to try to see that the advantages outweigh the disadvantages. And we must remember, and remind those among us who sometimes forget, that women are relatively disadvantaged already. The opportunities and benefits of computing (including the opportunity to develop the field at the research-level) should be open to us all. This is crucial for the welfare both of women as individuals and of our economy as a whole. The twenty-first century is nearly here, and many men look forward to it with excitement: the other 50% of us must be part of it, too.

WHERE ARE WE NOW?

Angela Bowey

The present situation with regard to women and computing is a very alarming one. This is despite the fact that the stereotypes, which are often levelled at women and which are supposed to prevent them from entering non-traditional areas of work, do not apply to computers. Indeed computing probably conforms to the stereotype of what women are supposed to be good at - requiring attention to detail, concentration and no great physical effort. Certainly there is plenty of evidence that, in the past, women have succeeded in the field of computing. Women are in senior posts amongst computer specialists.

The present situation is alarming because girls are now turning away from computing and computing has now become a field for boys and men. The evidence is clear. Firstly, you just have to look inside shops specialising in computers and all you will see is little boys playing with the computers. Secondly, girls are under-represented in computer courses at school level. Thirdly, computer company surveys show that home computers are used overwhelmingly by men and boys - 88% and more. Fourthly, media images associated with computers do not project women as users.

This alarming situation seems to be arising because of the growing importance of computers in careers and in successful occupations, and because things associated with successful careers are seen as more appropriate to boys than to girls.

The situation can be changed. It can be changed by our efforts - trying to get home the message that it is wrong, not necessary, not good for society, not good for our own children and not good for ourselves. The SWITCH campaign is one campaign aiming to get women and girls into the computing habit which points to a number of directions which can be taken.

Individual women and girls should take advantage of any opportunities their school, college or employer offers for learning how to use computers and for using them in their jobs.

If they can afford it they should buy a home computer (or use the one they have) and try some of the computing packages which are now available.

Schools and colleges should organise seminars, exhibitions, or workshops to attract and introduce women and girls to computing. They should organise sessions for female staff where they can be encouraged to use computers themselves. They should provide a room with computer equipment and encourage a computer club for girls on different days from the boys or in a different location. They should encourage female pupils to include computing in their courses of study, and provide courses in computing for girls who need to catch up.

Employers should organise sessions for female staff when they can be shown how to use computers and given time to try them out. Emphasis should be placed on making in interesting and rewarding to work with computers. Employers could provide a room with computer equipment which staff can use in their spare time, with someone on hand to give advice, and reserve some days just for women, (leaving some days just for men). They should ensure female staff are given equal opportunity to do tasks which need computing in their jobs. Don't always give these responsibilities to men.

And computer companies can make the SWITCH campaign (which aims to get Scottish Women Into The Computing Habit) a feature in their advertising to consumers in 1985 so that women and girls realise that we are trying to attract them especially to computers; lend equipment, give advice and provide speakers for events being organised by colleges, schools, women's organisations or employers; sponsor the SWITCH campaign with financial assistance for specific events, posters, advertising material, or the campaign itself; organise events such as competitions, exhibitions, or advertising campaigns specifically aimed at women and girls; develop and market software packages which will be of interest to women and girls, and encourage others to do the same.

SURVEY OF COMPUTER RELATED COURSES

IN SCOTTISH CENTRAL INSTITUTIONS, COLLEGES AND UNIVERSITIES

Kay Henning

Purpose

This survey was designed to provide statistics which would indicate the degree of male or female dominance in computer-related courses in Scotland and provide the means to extrapolate from these statistics to frame a general pattern. Whilst being as accurate as possible, these statistics are not necessarily definitive.

Parameters

A brief survey questionnaire was circulated to all Colleges, Central Institutions and Universities in Scotland. Of the institutions contacted, approximately 35% responded to the survey. They were invited to indicate comparative numbers of females and males on their computer related courses. These courses included those listed in the Microelectronics Education Development Centre publication 'Microelectronics, Electronics, Computing and Information Technology Courses in Scotland 1984-85' under the various institutions. Comments were also invited about the advertising of their computer related courses and any further information about gender compositions that might be of interest to seminar participants.

As a complementary exercise independent regional and school computer club contacts were circulated as well as members of the Community Education New Information Technology Group. Schools and independent computer clubs were invited to indicate comparative numbers of females and males in their club, reasons for any existing gender imbalance and ways in which this might be positively redressed.

Summary of Survey Results

A summary of survey results is to be found in Appendix I; it includes examples of female:male ratios on various computer-related courses on offer. It also features a representative sample of quotations taken from responses received from educational institutions and a similar sample taken from responses from schools. Collectively these summarise the findings of the survey and illustrate general attitudes and observations.

The results of the survey proved to be consistent with the generally understood pattern of gender composition in computer related issues: computer courses were no exception. Courses linked with traditional male occupations were predominantly male in composition, particularly those pertaining to engineering, instrumentation, electronics and the technological applications of microelectronics, whilst the few courses in which females predominated were solely linked to commercial and office applications, like word processing and keyboard operation.

In response to the school related question about whether girls should be positively encouraged any more than boys, there were slightly more responses in the positive, while some respondents stated that teachers should not enter into any kind of bias and that neither sex should be encouraged more than the other notwithstanding what appears as pre-existing female disenfranchisement from much of the skilled and creative use and development of computers. Suggestions for encouraging female involvement in computing at school included female only clubs, more women than men involved in running the club, active encouragement to all pupils, consistent use of female (and male) pronouns in describing the club and computer-related career opportunities, and encouraging female interest in video games.

Summarised Conclusions

There is a consistent pattern of male domination in computing and computer related courses.

This domination is particularly obvious in courses related to traditional male stereotype roles in engineering, technology and agriculture.

Female dominance in computer courses is related to non creative applications typically in word processing and automated filing applications.

Ratios in technically, agriculturally or nautically orientated institutions accentuate the male dominance and those in office and commercially orientated instutions, the female dominance.

There is approximate gender equivalence in introductory courses in computer awareness and elementary computing.

Both open-mindedness and traditional sterotype casting is evident in responses to the survey.

There is no evident conviction that course advertising policy should be altered to attract more women.

There is a consensus that gender imbalance in computer and computer related courses is a consequence of gender stereotyping continually reinforced by parents and media.

WOMEN, COMPUTERS AND ADULT EDUCATION

Elisabeth Gerver

There is a wrong assumption that has begun to appear that it is the equipment and not the people that matter. Furthermore, few men seem to notice that there are so few women in computing. At the same time, many women appear to be rejecting the new technologies and blaming computers for what men have chosen to do with them. Indeed, radical feminists have been asking whether using the technology, involves "a fatal compromise and collusion with the forces of patriarchy?"

In fact the under-representation of women in computing holds the seeds of a long-term threat to women. Individuals or groups who do not come to terms with these technologies may end up being mastered by the forces that they have tried to reject.

Where Does The Problem Occur?

Women are consistently under-represented at all levels of learning about and working with computers (Gerver and Lewis, 1985). Indeed, the phenomenon is so ubiquitous as to be banal. It is reflected in the uses of computers in the home, in the numbers of girls interested in computers in school, college and university and in training - particularly training for the unemployed.

It is also reflected in a small number of girls who attend computer exhibitions, even when programmes designed specifically for women are featured, and in the small number of women who explore computer based facilities in libraries, even though the libraries have generally more women users than men. Most members of the computer games sub-culture and of computer clubs are men and boys.

Within community education, the position may at first appear less serious. In Britain in 1982/3 men outnumbered women in adult education computing classes by only about two to one and our survey indicates that, in Scotland, the proportion of women may be twice that of men. However, since women predominate in adult education classes generally, the population from which such an encouraging population of women is drawn does not consist equally of men and women.

Women are also significantly under-represented in using computers at work. While 75 to 100% of all workers at the lowest level of computing - entering data - are women, women in the highest levels, programmers (5 to 15%) and systems analysts (less than 5%) are rare indeed. The number of women engineers in Britain (1 in 300) is the lowest in the Western world.

Why Does the Problem Occur?

There are many inter-locking reasons for this situation.

1. **Social Reasons**

   (a) The careers advice given to girls is often misleading or downright discriminatory.

   (b) Peer group pressure, including pressure from boys, may discourage girls from computing.

   (c) Many teachers believe that parents are crucial in discouraging girls by associating computing with traditional boys' fields like engineering.

2. **Womens' Own Perceptions**

   (a) Many women feel anxiety faced with computers. This has a lot to do with the way in which computers are often presented in mathematical terms.

   (b) Many women feel bored at what they see as the trivialities of the uses to which computers are put. Their interest is not aroused unless they see them being used to help with real problems.

3. **Emotional and Ethical Reservations**

   Many women reject the ethos of competition surrounding computers and the violence associated with many computer games. They are also alienated by the ways in which computers are used for social, economic and military control.

4. **Practical Constraints**

   In severely practical terms, women tend to have less time and money to spend on themselves. The affects their opportunities to use and own personal computers.

Why Change?

The following are some of the more compelling reasons for increasing the number of women in computing.

1. **Vulnerability**

   Unless women come to terms with the new information technologies, women will not be able to obtain the new jobs which computing may create. On the other hand, computers are de-skilling and increasing unemployment in areas of traditional female employment.

2. **Waste**

   The present gender imbalance in computing is wasteful. Evidence of the performance of the few women who take advanced computer courses suggests that women represent a huge pool of unrealised talent.

3. **Social Skills**

   Evidence suggests that women are more sensitive to social needs. If women played an increased role in using computers, a more humanely balanced view of appropriate applications of computers might result.

How To Change

The whole purpose of the seminar is to hear other people's suggestions about this. The following strategies are offered as starting points.

1. Reaching girls - as suggested in our survey.

2. Counselling girls about taking up computers as a career.

3. Providing single sex settings at least for some girls and women.

4. Helping women to cope with domestic responsibilities, children etc. (many women would appreciate modular or open learning approaches).

5. Monitoring data about female participation - there appears to be a willingness to do this which would help to identify problems.

In addition there are other ways relating to adult learning in general, such as starting with people, creating confidence, speaking plain English and acknowledging diversity.

A final example from New Zealand shows that what women in a single sex course liked about courses with these characteristics was they felt able to ask any questions they liked, felt able to exchange ideas and hear about each others' problems. I hope that that will be true for us all today as well.

References

Gerver, Elisabeth and Lewis, Linda. 1984. "Women, computers and adult education: Liberation or Oppression? " Scottish Journal of Adult Education, Vol 7 No 1. pp. 10-19.

POSITIVE ACTION IN ENGLAND

Wendy Miller

Introduction

In February 1984 a short article appeared in Sheffield Today, Sheffield City Council's Civic Newspaper, describing a new course in micro-electronics and computing for women. Within two weeks over 500 applications had been received and a further 500 names taken.

Why were so many women seeking further training and why was this particular course so popular? An analysis of information from 100 of the application forms partly answered these questions.

Previous Education

Academic Qualifications

Type	%
None	48
R.S.A. (typing)	21
C.S.E.	8
'O' Level	14
'A' Level	2
Degree or equivalent	2
Professional e.g. SRN	5

Figure 1.1

Figure 1.1 details the academic qualifications of the applicants. Many of the women had left school early in order to start a family and this goes some way to explain why over 70% had no academic qualifications other than perhaps a typing certificate. The C.S.E. or G.C.E. passes that some women did have were usually in "Arts" subjects - traditional subjects for women - and were often combinations of unrelated subjects that showed no planning for a particular career.

The under-representation and under-achievement of girls in mathematics and the physical sciences is well documented and in recent years positive action programmes e.g. Girls Into Science and Technology (G.I.S.T.) have been initiated in an attempt to counteract this. However, the specific problem of girls and science should not hide the fact that, across all disciplines, the social pressures on young women encourage them to regard their education as being secondary to marriage and raising a family.

Employment History

Given many girls' attitude to education, the statistics of womens' employment history are hardly surprising (Fig 1.2, 1.3).

Years Unemployed	%
1-4	27
5-9	33
10+	33
no reply	7

Figure 1.2

Recent Employment	%
None	59
Service	23
Clerical	12
Manual (Industrial)	3
Other	3

Figure 1.3

Firstly it must be recognised that many women do not consider themselves to be "unemployed" despite the fact that they are not in work and are actively seeking work.

From Figure 1.2 it can be seen that over 65% of the sample had been without a job for over 5 years. If the respondents were male they would be described as 'long term unemployed' and a cause for concern, being female, they are classed as 'mothers' or 'housewives' and so ignored.

Figure 1.3 analyses the recent employment history of the applicants. The majority of women who are in employment have jobs in the service-sector doing jobs similar to those they have traditionally done in the home (nursing, catering, cleaning). In addition, many of the jobs were part-time, badly paid and often temporary. A recent government survey showed that 67% of all women's jobs were in just three occupations, namely clerical, cleaning and hairdressing, and health, education and welfare.

The under-representation of women in the science and technology field is well documented. According to the Engineering Industry Training Board (E.I.T.B.) figures in 1981/2, 4% of all technician trainees were women and in 1982 women formed 3.5% of the professional engineers, scientists and technologists. Of those women who do have employment in the manufacturing/industrial sector 90% are in relatively low-skilled jobs e.g. clerical, operators.

Adult Training

Central Government now puts great emphasis and resources into vocational training/re-training opportunities. However, as Figure 1.4 shows, 90% of the applicants to the Women's Technology Training Workshop (WTTW) who are obviously women interested in taking up training opportunities, had had no "adult training".

Adult Training/Education	%
None	90
TOPS	5
WOW/W	1
F.E.	2
A.E.	1
Other	1

Figure 1.4

Nationally, in 1980/1 only 30% of the places of the MSC sponsored Training Opportunities Scheme (TOPS) courses were occupied by women. As in compulsory education, there is a pronounced under-representation of women on New Technology courses. For example (again 1980/1 figures) women accounted for 70% occupancy of office-skills courses but only 4% of skill-centre places (where the emphasis is on engineering and technology). Locally, women occupy 20% of MSC funded adult-training places.

Motives for Training

Figure 1.5 shows the reasons the women applicants gave for applying for the WTTW course. The response to the publicity refutes the suggestion that women are quite happy to stay at home and Figure 1.5 shows that over 70% of the women applied with a view of the course leading to employment. This highlights the changing economic, political and social position of women in the workforce.

Motives for Applying	%
Learn new skill	42
Get an interesting job	20
Update office skills	13
Bored at home	11
Become self-supporting	7
Keep up with the children	4
Meet people	3

Figure 1.5

Positive Action and Women's Workshops

From the foregoing it can be seen that there exists a large proportion of the adult population who under-achieved at school, are often long-term unemployed, are often unattracted by mainstream adult training strategies, and who, because of their changing social position, are now seeking well-paid, permanent employment.

It is now widely recognised that this situation calls for positive action and slowly "innovative" projects designed to improve the opportunities for women have evolved. Throughout England there are now women-only courses either designed to publicise provision to women (e.g. NOW and WOW courses) or to provide intensive training to women in non-traditional areas of employment.

The Women's Training Workshops are one type of such projects. The first of these opened in Lambeth in 1982 and was soon followed by East Leeds (1983: New Technology), Liverpool (1984: New Technology), Haringay (1984: New Technology and Craft Skills).

These different workshops have similarities (women-only students, mainly or all women tutors, funded by European Social Fund, training in New Technology, a desire to make the course as accessible as possible) but there is no overall co-ordination or agreed structure and each workshop has different priorities and emphases.

Sheffield Women's Technology Training Workshop

The aim of Sheffield WTTW is to provide training in micro-electronics and computing for women between the ages of 25 and 50. The course can be broadly classed as vocational and applicants must be unemployed, under-employed, threatened with unemployment or wishing to return to work after a period of child-rearing. The training programme is specifically tailored to suit unskilled women who have been unable to take advantage of existing training facilities in this field. This undoubtedly accounts for the exceptional popularity of the course. Elements in the course design which take account of women's needs are:

(a) there are no formal academic entry qualifications;

(b) the courses are part-time so that women can carry out their other commitments;

(c) childcare is arranged by and paid for by the WTTW and so women with children have equal access to the course;

(d) the courses are administered and taught by women which, by providing role-models, serves to strengthen the concept of women in a traditionally male environment;

(e) the women are reassured by the adult-only environment.

The WTTW course is modular-based with a weekly timetable. The trainees study all the subjects and as a rough guide, spend a third of their time on computing, a third on electronics and the remaining third on mathematics. Each year about a third of the trainees sit the mathematics GCE "O" Level and this, in conjunction with their year at the centre, stands them in good stead for entry to further and higher education. Towards the end of the year, the trainees go out on a six-week work experience placement in the public or private sectors.

To date two courses have been completed and approximately a third of the ex-trainees have found employment - including computer clerical work, community work and Adult Education tutor in New Technology. A third have continued their study at college or polytechnic. For example, in October two ex-trainees begin an HNC in Industrial Electronics at Sheffield Polytechnic - the only two women on the course!

After almost two years, the WTTW has proved itself to be immensely successful. It has demonstrated the need for special training provision for women in New Technology and has shown how much women are capable of achieving if only given the opportunity.

The Women's Workshop goes beyond the issue of women and computing and points to the more fundamental problems of women's education, training and employment. The integration of well-resourced projects like the Women's Technology Training Workshop into the mainstream educational provision is crucial if there are to be wide-spread enhanced opportunities for women.

POSITIVE ACTION IN SCOTLAND

Gillian Skirrow

'Do you think girls should be positively encouraged?'
'No - teachers really should stay clear of this kind of bias.'
(from sample of quotations from School Computer Club Contacts in Kay Henning's Survey, Appendix I).

The research that Kay Henning has done on women on computing courses in Scotland shows that women outnumber men on introductory word-processing courses, but that on any more creative course men massively outnumber women. This situation is likely to be perpetuated as long as people believe that the present gender division of labour reflects essential 'feminine' or 'masculine' qualities and that to try to change anything is to be biased against nature.

One of the most necessary tasks, and most powerful forms of positive action, is therefore to introduce courses on the construction of gender as a compulsory element in teacher training, and, for that matter, as an element at all levels of education. But we cannot, of course, wait for that to happen. Another way to persuade people that present gender divisions are not 'natural' is to show that, women and men are perfectly capable of doing each others traditional jobs. And we cannot wait for that to just happen either. Opportunities have to be provided.

It would be too sweeping a generalisation to say that Scotland is miles worse than England in its computer provision for women, but there is certainly nothing like Wendy Miller's 'Women's Workshop'. A certain amount of work has been done and I propose to present it in relation to a list of possible strategies. The strategies are taken from research done by the National Foundation for Educational Research (NFER) on factors which have been found to influence girls entering science and technology.

Strategies

1. Take Promotional Initiatives

In a situation where 'women' and 'computers' are an unthinkable combination, scholarships and financial incentives are important in attracting women's attention to a new field. Scottish universities have for some years run 'insight' courses in science and technology for girls, which are subsidised by the University, the Department of Industry for Scotland, and SDA and commercial companies. In 1985 Strathclyde University hosted an 'insight into computing' course.

2. Improve Careers Guidance Materials

Careers teachers and advisers should be demanding more materials to attract girls into non-traditional areas.

Strathclyde University has produced a series of video programmes on 'different' careers for women, and one on "Women and Computers" is in the pipeline. But there are difficulties in getting them distributed in schools.

3. Encourage Women-Staffed Courses

The NFER found that courses that have women staff are more likely to have above-average proportions of women students. There are very few computer courses in Scotland that have women staff at all.

4. Take Activities into Schools

Some colleges at present run 'open days' in their computing departments, and Strathclyde University prepared a conference for school pupils and staff which had to be cancelled because of the EIS action. But it has been shown that if computing staff can actually take their wares into the schools there is a greater take-up.

5. Remove Hidden Barriers

Language can be a powerful barrier, not least in the use of the masculine pronoun in supposedly neutral situations. In the advertising of computer hardware and computer courses this 'he' becomes even less neutral when it is reinforced by an illustration of a male computer user. Strathclyde University has accepted a recommendation from its Steering Board for Opportunities for Women that all University documents and publicity should use both the female and male pronouns throughout, and this would be a useful strategy for all those running computer courses to adopt.

6. Reduce Sex Stereotyping in Software and Curricula

If it is obvious from the course materials and curricula that someone has tried to make women feel included they will be encouraged to study that subject even though it is in a non-traditional area for women. At Strathclyde the men running the computer course have submitted their syllabus to the Women and Computer Group. Such openess to discussion is to be welcomed, and hopefully copied.

7. Take advantage of Existing Schemes

(a) YTS schemes

These offer a potential for positive action but the evidence suggests that girls are still being channelled into non-technical schemes. The Technical and Vocational Education Initiative (TVEI) must do better.

(b) MSC and Open Tech Schemes

Women need to be made more aware of such schemes and encouraged to join them.

8. Examine Qualifications

Institutions need to look at whether the qualifications they ask for are really necessary or whether they are simply left over from an outdated system. If the qualifications are necessary and most women do not have them, then some kind of conversion course should be provided, and study times arranged in a flexible way. Stirling Univeristy has pioneered a modular degree course, and Strathclyde University is now introducing many more opportunities for part-time study.

9. Introduce Short Courses

Girls are reluctant to enrol on technical courses of long duration unless they have done an introductory skills-based course first. In Scotland there is nothing like the Workshops that Wendy Miller described, and it would certainly help if community and adult education could provide more familiarisation courses.

10. Provide Distance Learning Facilities

The provision of a package, perhaps including video, so that women can study at home on their own would seem to be more attractive to women than attending courses where they are outnumbered by men.

11. Provide Opportunities for Updating and Retraining

Strathclyde University has run two successful 'Wider Opportunities for Women' courses on Information Technology each of eleven weeks. Sixty per cent of the students got jobs afterwards.

12. Encourage Sponsorship

Because women tend to have less money than men they often cannot afford to go on courses. Men on the other hand are sometimes paid to go on courses by their firms. If firms could be persuaded to take part in a little positive action by setting up sponsored places on courses for women the resulting publicity would have effects far beyond the few women who would actually take up the places.

Women and Technology

'Women and Technology' is usually seen as a sociological 'issue'. But I should like now to speculate from a different angle on why women show so little interest in technology and sometimes even oppose its use. This speculation is based on my own research on psycho-analytic mechanisms operating in video-games, on research into feminist literature, and on the different viewing patterns of television programmes between women and men.

The evidence* suggests that pleasure and anxiety are closely related; both sexes deal with their anxiety by fighting fantasy battles, the site of which is the mother's body. They then feel guilt about the damage they have done and try to make reparation. Given the present construction of gender in our society, men put more emphasis on fighting the fantasy battles, and women put more emphasis on trying to restore the damage they feel they have done. Technology becomes equated with the weapons used to fight the battles and hence is a help in the men's fantasies but an obstacle in the women's. What may help in this situation is the devising of video-games and other software which emphasise co-operation rather than competition, and exchange of words rather than exchange of gunfire.

* For a more detailed account of this research see Gillian Skirrow, 1986. Hellivision - an analysis of video-games. In Colin McCabe(ed), High Theory/Low Culture Manchester, University Press.

WORKSHOP REPORTS

Work Training

1. The issue of women and computing in work training is part of the broader issue of women and their place in the workforce. Women tend to be in low paid unskilled areas and new technology does not, in fact, break through this barrier. Training provision has to take account of this.

2. Computer awareness courses need to be expanded and developed, and be offered more on a day release basis. Managers should be made aware of the value of allowing their staff to take up such opportunities.

3. In the present economic climate there is a conflict of interest in the introduction of new technology between employers and workers. As a result, it is often difficult to get agreement on training. Education and training for employers and for trade unions on the needs and requirements of training are necessary.

4. One underlying issue is whether the poor demand from women was governing the provision of training. Why do women demand less? This question relates to school education etc.

5. There is a need to publicise courses, the need to build confidence, finance. How to make the legislation designed to improve women's situation more effective?

6. Programmes need to be designed which allow the bulk of women in unskilled, low paid, jobs with few training opportunities, to break out of their situation in the labour market. That is a real problem.

Further Education

While sex stereotyping is a problem, the following positive suggestions were made:

1. There should be more seminars/workshops organised to attract women.

2. Sponsorship money from the EEC, MSC etc. should be sought.

3. Training should be available for girls and women only, and for women of particular age groups.

4. Further education staff, particularly female staff, need more access to computers in order to become involved with computers.

5. Access to hardware, particularly for open learning and flexi study courses, should be improved. Accessibility is extremely important for people studying at home.

6. More thought needs to be given to child care provision, not necessarily on the premises.

7. Marketing courses to women, making contact with women through e.g. coffee mornings, is a priority.

8. Fee structures should be simplified. Account should also be taken of additional financial costs for women with families - travel etc.

Higher Education

1. There are few part-time courses and this discriminates against people with family responsibilities. In addition, there are very few grants for part-time courses. If part-time courses were offered, there would be a great demand for them at all levels.

2. Computers appeal to boys much more than to girls because boys progress from buying games, which are generally violent, to writing their own. This leads to an interest in programming which, in turn, leads to a growing interest in the computer. Because girls are not so interested in such violent games, they miss the vital first step. There is thus a need to develop computer programs which interest girls. What kind of game that might be is not clear, but programs built on familiar female role models do not seem to be the sort of thing that is required.

3. There are very few female academic staff. In the Department of Computer Science at the University of Strathclyde, there are none, and there are few in others. It seems they just do not apply.

Community Education

1. Community education generally is very under-resourced, compared to schools and colleges, even though there is an important role for community education in the area of new technology.

2. Computer literacy must be provided across the whole population, but especially for women. But it is not necessary to be an expert programmer to use a computer, any more than to be a garage mechanic to drive a car; hands-on experience is vital.

3. Since community education in general is still exploring appropriate applications of computers in the community, it is very difficult for women to decide what they want to do with them. There is a need, especially for women at home, to explore what to do with computers and what are the appropriate uses there.

Broadcasting

1. The computer literacy campaign had apparently failed to have an effect on encouraging women to become involved in computing. Samples of programme material were considered to see what could be done and how it might be different. There was some discussion of whether programs which aimed specifically at breaking down women's stereotypes didn't, in fact, reinforce them by stigmatising women as unusual users. One thing broadcasting might try to do was to sell the career benefits to women of being involved in computers.

2. The range of settings in which women were portrayed using computers needed to be much greater, since they themselves tended to see these uses in military and industrial terms. Addressing women at home, with children, promoting educational uses of computers were fruitful possibilities.

3. Involvement in co-operative learning was suggested as a way to get rid of the competitive element, which was unattractive to women.

4. Finally, one suggestion was made that broadcasting had, in fact, done a good job in promoting computers. What might have happened was that women, armed with the knowledge about what computers could do, had decided to reject them.

PERSPECTIVES

In the discussions at the conference, some of the important issues raised by participants included:

Control

Do women merely use or do they actively control computers? For years women have done the washing and now use washing machines to do it, but they have never controlled the processes that went into producing these machines. They just used the output - a deskilled, mostly unpaid, piece of work. Computing is thus part of the wider problem of encouraging women to believe that they can control science and technology themselves.

Perceptions

There is also the question of the way in which computers are perceived, mainly by men, primarily as hardware. Men tend not to see computers in the context of problems that need to be solved. We need to rethink the way in which computers are used in relation to the needs of both men and women.

Intervention is required at all levels of education to bring about more of a women's perspective on computers. Less radically, women can be encouraged to play a greater role in current applications of computers. In many institutions the computer is located in the Science Department, rather than the English Department where it could be linked with word processing applications. There is a need to reach teachers in schools to raise awareness of the issues of gender and computers and to offer them positive suggestions for ways ahead.

There is evidence that the computer language LOGO may be particularly attractive to girls, perhaps because it is relatively easy to use to make interesting things happen, to handle sentences and to create fascinating patterns. Yet the SED Working Party to determine the syllabus for certificates in computer studies in Scottish Schools has rejected LOGO as a computer language.

Antagonising Men and Women ...

Is there a danger of antagonising girls who don't identify themselves with this movement and possibly more importantly antagonise men who are fathers? It may be that antagonism

is necessary to get people to think. Men don't see the absence of women as an issue. In any case, it may be wrong to assume that fathers are the main influence on girls.

Resources

Community education, which is supposed to be able to reach those parts that others cannot reach, is hampered by an overall lack of resources. Adequate resources for community education are thus an urgent priority.

SURVEY OF GENDER COMPOSITION IN COMPUTER-RELATED COURSES IN SCOTTISH COLLEGES, UNIVERSITIES AND CENTRAL INSTITUTIONS

(a) SURVEY OF RESPONSES

The left hand column lists courses presently available at Scottish colleges, universities and/or central institutions which are typical examples of the various gender-related categories listed. For each course the number of female and male students typically on such a course is illustrated by reference to the actual numbers in one institution running the course concerned.

Sample of Courses	Representative female:male student ratio
Exclusively Male	
Industrial Measurement and Process Control with Elementary Computing	0.12
Mechanical and Production Engineering	0.10
Instrumentation and Process Control	0.86
Micros in Computer Aided Engineering	0.10
Predominantly Male: Ratio > 3:1	
Electrical and Electronic Engineering	16.338
Offshore Electronic Systems	2.11
Information System Technology	3.13
Applied Physics with Electronics	5.43
Programming Systems/Elementary PASCAL	2.10
Applied Physics with Electronics	5.53
Microprocessor Programming and Interfacing	1.16
Programming Micros	17.78
Microcomputer Familiarisation - Recreation Managers	1.7
SCOTBEC SHND in Data Processing	5.23
Introduction to Relational Databases	2.12
New Technology Applications in Manufacturing Industry	2.75
Assembly Language on the BBC Micro	2.28
Microprocessor Servicing for Technicians	1.29
Communication and Electronic Engineering	3.53
Electronics and Physics	3.29
Computer Science and Electronics	1.55
Microelectronics	3.28
Male Orientated: 3:1≥ Ratio > 1.9:1	
HND in Computer Data Processing	15.26
Computing and Data Processing	9.27
Diploma in Systems Design and Analysis	6.13
Certificate in Computer Studies	10.23

Higher Diploma in Computer Studies	22.57
Elementary Computing	10.16
Threshold Data Processing/Small Business Systems	10.20
Computer Studies	8.20
Introduction to Computer Programming in BASIC	28.58
Computer Science	38.105
Diploma in Information Technology	4.11
Further BASIC	8.13
Computer Science and Management Science	5.11
Interfacing	3.9

Approximately Equal Female:Male
1.5:1> Ratio ≥ 1:1

Direct Study Computer Workshop	13.13
SCOTEC Elementary Computing	17.21
Understanding the Micro	4.4
Programming (BASIC) (College of Commerce)	20.21
Business Computer Applications (College of Commerce)	10.9
Computer Data Processing (College of Commerce)	13.10
Microcomputer Awareness Course	26.22
Elementary Computing	30.40
Programming Microcomputers in BASIC	31.36
Computing Modules	6.4

Female Orientation 3:1 ≥ Ratio > 1.5:1

Elementary Computing	12.7
Community Activities - Computer Familiarisation Course	5.3

Predominantly Female: Ratio > 3:1

Computer Competence	31.1
Computer Awareness	200.50
Computing Modules (evening class)	50.5
Information Technology for Nursing Management	15.4
Integrated Word and Data Processing - Word Star Extensions	7.2

Exclusively Female

No Courses

(b) SAMPLE OF QUOTATIONS FROM SCOTTISH COLLEGES, UNIVERSITIES AND CENTRAL INSTITUTIONS

1. Supply any information which you think might be of interest to seminar participants in relation to the female/male composition of computer-related courses run by your institution.

"My suspicion is that in general, female students in more advanced courses take the course more seriously and perform better. This college does not 'market' computer courses, due to lack of resources, both hardware and teachers. All suitably qualified students are accepted for more advanced courses; applicants for elementary courses are selected on the basis of qualifications".

"The course participants are exclusively college staff. There is a probable sex imbalance in the population from which the participants are drawn".

"Advertising in the press produced enquiries almost exclusively from females whose main interest was in word processing, nearly all of whom were accommodated. For other courses, as the statistics show, the response is favourable from both male and female with the sole exception of Engineering. Marketing aimed at the unemployed attracts almost exclusively female applicants".

"Misconceptions both by careers leaders and the general public of suitable entry qualifications and the content of computer related courses: also misconceptions of employment prospects and computer application areas".

"Females are better represented in Elementary Classes, particularly evening classes, than in the more advanced classes. Our own courses tend to concentrate more on the technical and mathematical applications of computing than the commercial applications. I suspect that commercial computing courses might attract more females".

"The proportion of females on computer courses is significantly higher than the proportion of females in the college population".

"Most of our courses are in-service courses for existing teachers, many from Primary. As such, there is no male bias in them: in fact, the opposite tends to be true. In particular, this year's postgraduate certificate class is all female".

"Much demand from females on 'caring' courses and secretarial for computing".

"All college courses are open to entry qualified persons irrespective of colour, creed, race or sex".

"I think that the provision of courses on an evening course basis give a student breakdown far more heavily biased towards the female population".

"The decision not to do computing at university is usually made before they arrive. Note the figure for Management Science as nearly 50/50: this may be because first year includes Business Studies Students".

"All applicants considered on academic merit. Open learning attracts both male and female students. Short courses are work-orientated and are heavily subscribed by male employers".

2. Please indicate ways, if they exist, in which you would be willing to alter your approach to make the computer-related courses run by your institution more accessible to women.

"Perhaps we could put posters illustrating possible attractive careers for women in computing in schools - a careers board and at careers conventions which we do attend but make no attempt to attract any particular sex. I think early attitudes are established long before the 16+ stage".

"I do not see much point. I already have courses geared to the secretary/typist/clerical staff which aim to cater specifically for their needs".

"We feel that our wording does not discriminate or influence".

"We intend to offer more commercially-biased courses in the future".

"The college is willing to consider any cost effective way of providing a better service to any client group including women".

"I don't think from us this is necessary".

"We have introduced a range of open learning modules on engineering and computing topics, e.g. Introduction to Digital Logic. They have been taken up by men on a company basis".

"The introduction of modular programming and open learning schemes this year may influence more women to apply for courses than in the past. Any career/guidance sessions arranged by course personnel stress the suitability of computer courses in leading to employment opportunities for women".

"Open days are useful, but compulsory short courses with hands-on experience associated with definite

application areas are most useful in demonstrating the ease of use of computing, and we have found this results in increased interest by the girls who were critically less forthcoming than the boys".

"We would be willing to help make improvements in the balance on full-time courses in any positive way".

"We are considering holding an open day for schoolgirls probably aged about 13-14. The purpose is to counteract the current trends which seem so prevalent in the home and school that computing is for boys only. Until the rise of the small home micro we had few problems: a large proportion of girls tried computing science at university. Over the last three years this has changed and for all the wrong reasons. Our previous experience led us to believe girls were equally able at computing - perhaps even better as they seldom became 'hackers'".

"We feel women are well catered for in this college and therefore no change is required".

(c) SAMPLE OF QUOTATIONS FROM SCHOOL COMPUTER CLUB CONTACTS

1. Assuming club members or course participants are predominantly male, why do you think girls are evidently less enthusiastic about joining and participating?

"They would rather do other courses, i.e. Home Economics, Art etc".

"This is not always the case in my school".

"Very difficult to know. I've got a feeling it goes a lot deeper than computing. Maybe lack of women teachers in the field or even interested".

"Amongst school students computing is seen as a 'male' preserve presumably because most members of the computing games 'subculture' are male".

"More boys have computers at home and hence they feel very confident talking about and using computers".

"Because of early exposure to 'male/female' activities at school, particularly in relation to Electronics and Engineering".

"Far smaller proportion of women purchase personal computers"

2. Do you think girls should be positively encouraged?

"Yes".

"Perhaps slightly but how".

"No - teachers really should stay clear of this kind of bias".

"Yes - e.g. in careers information, in college/university information, advertising should show women competently using computers".

"No".

3. If an evident gender imbalance exists, please indicate ways in which the school wishes and would be willing to alter its approach to make courses and the computer club more accessible to girls (or boys)?

"While pupils have a free choice it is difficult to get girls to do these subjects".

"Open to suggestion".

"The creation of a girls only club so that they don't get the feeling that the boys will laugh at their expertise".

"In course talks to students I will stress that computing is not a purely male preserve and that computing is a vital component of future careers/leisure of both sexes".

"Encourage a female member of staff to be involved in the running of the club".

"You would have to start the education in primary school and participate in the education/information non-game side of computing".

"Encourage girls to be interested in 'zapping' aliens in computer and video games rather than sindy dolls and clothes, since it is from this initial interest most young boys progress to computer programming and electronics".

4. Any further comments which you think would be of interest to seminar participants.

"The main problem is not with the schools - it is mainly with the attitude of society in general and their parents in particular. This is particularly true in a rural community".

"Girls are very methodical and keen but for some reason seem to lack flair and stick very rigidly to learned techniques instead of experimenting as boys often do".

"Amongst adult classes there is a general imbalance the other way! Programming courses show a slight male predominance. Word processing and software courses show a strong female predominance. This is because many of the women either use (or have used) computers in their employment".

"Encourage parents to buy computers for their daughters".

"I believe that in many instances the early education of children in the area of male/female activities especially by parents is to blame in this 'restriction' of computers and engineering to males".

APPENDIX II

SEMINAR ON WOMEN AND COMPUTING
JUNE 14 1985

AIM: The purpose of the seminar was to bring to the attention of the providers of formal and informal adult education the need to encourage more women to contribute to the development of computing and literacy, and to suggest positive steps by which they could do so.

Programme

10.00 - 10.30	Registration and Coffee; displays
10.30 - 10.35	Welcome by Dr Graham Hills, Principal, University of Strathclyde
10.35 - 12.30	**"Where We Are Now"** Chair and Opening Address: Professor Angela Bowey, Professor of Business Administration, University of Strathclyde.
	"Women, Computers and Adult Learning" Dr Elisabeth Gerver, Director, Scottish Institute of Adult Education
	"Positive Action in England" Dr Wendy Miller, Sheffield Women's Technology Training Workshop.
	"Positive Action in Scotland" Ms Gillian Skirrow, Lecturer in English Studies, University of Strathclyde.
	Questions
12.30 - 2.00	Lunch and Displays
2.00 - 3.00	**Workshops on women and computers in:**
	WORK TRAINING - Ms Yvonne Strachan, STUC
	FURTHER EDUCATION - Mr Alex Inglis, OBE, formerly Principal, Telford College
	HIGHER EDUCATION - Professor Andrew Colin, Professor of Computer Science, University of Strathclyde.
	COMMUNITY EDUCATION - Ms Kate Phillips, Tutor Organiser, WEA, West of Scotland.
	BROADCASTING - Mr Roberts Salkeld, BBC Continuing Education.

3.00 - 4.00	**"Where Do We Go From Here?"** Chair: Dr Elisabeth Gerver, SIAE
	Closing Address: Professor Margaret Boden, University of Sussex.
	*Professor Boden was unable to attend and the programme was re-arranged as follows.
3.00 - 3.30	Report Back from Workshops
3.30 - 4.00	Discussion

WOMEN AND COMPUTING SEMINAR, FRIDAY 14 JUNE 1985

List of Participants

Mr A Anderson	Community Education Office, Alness
Miss Lesley I Baird	Tayside Regional Council, Kirkton Community Centre
Dr C Bamford	Continuing Education Officer, BBC
Mrs M Barrowcliffe	Glasgow College of Building and Printing
Mrs M Beynon	West Lothian College of Further Education
Mrs A Burnside	Dept. of Office Organistion, Strathclyde University
Mrs M Butler	Dept. of Office Organisation, Strathclyde University,
Miss Gwendoline Christie	Asst. Director of Education, Grampian Regional Council
Miss S Clarke	Dept. of Office Organisation, Strathclyde University
Ms Sandra Connor	Dept. of Adult & Continuing Education, Glasgow University
Dr C Craig	Continuing Education Officer, BBC
Ms J Crompton	Napier College
Dr Alan Durndell	Dept. of Psychology, Glasgow College of Technology
Dr Portia E File	Dundee College of Technology
Mr J Finlayson	MSC Training Division
Ms J Fitzgerald	Glasgow District Council
Ms Gill Gibson	Scottish Community Education Microelectronics Programme (SCEMP)
Mrs J Grant	Glasgow College of Building and Printing
Ms J Hardie	Cambuslang College
Mrs S Howie	Glasgow College of Building and Printing

Mrs J Johnston	Glenrothes & Buckhaven Technical College
Mr K Johnston	Artificial Intelligence Applications Unit, Edinburgh University
Mrs R Lynn	Robert Gordons Institute of Technology
Mr I Madill	Kingsway Technical College
Ms Rose Milligan	Strathclyde Regional Council
Mrs Helen Munro	Further Education Officer, Strathclyde Regional Council
Mr T McFadden	Scottish Microelectronics Development Programme (SMDP)
Mr J McGinness	Glasgow College of Nautical Studies
Mrs J McKerrow	Clydebank Technical College
Miss A MacKinnon	Dept. of Electronics and Electrical Engineering Glasgow University
Miss N MacMorrow	Dept. of Office Organisation, Strathclyde University
Miss E Proudfoot	Dept. of Office Organisation, Strathclyde University
Dr J Richards	Turing Institute
Ms G Siann	Glasgow College of Technology
Ms L Stobo	Dalmuir Community Education Centre
Ms M Sutherland	Scottish Microelectronics Development Programme
Ms C Thomson	Glasgow Eastern Area Renewal (GEAR)
Mr R Underwood	Owl Productions
Mr M J Wrenall	Dept. of Psychology, Glasgow College of Technology
Mrs C Young	Dept. of Office Organisation, Strathclyde University

Main Speakers

Professor Angela Bowey, Professor of Business Administration, University of Strathclyde.

Dr Elisabeth Gerver, Director, Scottish Institute of Adult Education.

Dr Graham Hills, Principal, University of Strathclyde

Dr Wendy Miller, Sheffield Women's Technology Training Workshop.

Ms Gillian Skirrow, Lecturer in English Studies, University of Strathclyde.

Rapporteurs

1) Professor Andrew Colin, Professor of Computer Science, University of Strathclyde.

2) Mr Alex Inglis, OBE, formerly Principal, Telford College.

3) Ms Kate Phillips, Tutor Organiser, WEA, West of Scotland.

4) Mr Roberts Salkeld, BBC Continuing Education.

5) Ms Yvonne Strachan, STUC.

JOINT WORKING GROUP ON WOMEN AND COMPUTERS

Membership

Dr Elisabeth Gerver (convener)	Director, Scottish Institute of Adult Education
Ms Lesley Hart (secretary)	Deputy Director, Continuing Education Centre, University of Strathclyde
Ms Jean Barr	District Secretary Workers' Educational Association, West of Scotland
Ms Kay Henning	Individual member
Mr Ron Miller	Scottish Officer, Equal Opportunities Commission
Ms Maggie Monteith	Individual member
Mr Chris Pilley	Senior Development Officer, Scottish Community Education Council
Ms Gillian Skirrow	Lecturer, Department of English Studies, University of Strathclyde.